WHAT IS CLAIMED IS:

1. A flowing junction reference electrode comprising:

a reference electrolyte solution having a viscosity η and a pressure P_E;

a sample solution having a pressure P_S, wherein the difference between P_E and P_S is a pressure differential ΔP;

a liquid junction member having N discrete nanochannels, the nanochannels having diameters D and lengths L;

wherein the junction member is situated between the electrolyte solution and the sample solution, and

wherein ΔP, D, η, and L are selected such that $\frac{D^2 \Delta P}{32 \eta L}$ is greater than about 0.1 centimeter per second.

2. The electrode of Claim 1, wherein N is less than approximately 100,000 and greater than approximately 10.

3. The electrode of Claim 2, wherein N is less than approximately 50,000.

4. The electrode of Claim 2, wherein N is less than approximately 10,000.

5. The electrode of Claim 2, wherein N is less than approximately 1,000.

6. The electrode of Claim 2, wherein N is greater than approximately 100.

7. The electrode of Claim 1, wherein a diameter D_i of any one nanochannel is substantially equal to a diameter D_j of any other nanochannel.

8. The electrode of Claim 1, wherein D is greater than approximately 1 nanometer and less than approximately 900 nanometers.

9. The electrode of Claim 1, wherein D is greater than approximately 10 nanometers and less than approximately 500 nanometers.

10. The electrode of Claim 1, wherein the nanochannels are coated.

11. The electrode of Claim 1, wherein the junction member is made of a polymer.

12. The electrode of Claim 11, wherein the polymer is selected from the group consisting of polycarbonate and polyimide.

13. The electrode of Claim 1, wherein the junction member is made of silicon, glass, or ceramic.

14. The electrode of Claim 1, further comprising means for maintaining positive linear flow of the electrolyte solution through the nanochannels and into the sample solution.

15. The electrode of Claim 14, wherein the means for maintaining positive linear flow of electrolyte flow is selected from the group consisting a pressurized collapsible bladder, an electro-osmotic pump, a mechanical pump, a piezo-electric pump, and a electro-hydrodynamic pump.

16. A flowing junction reference electrode comprising:

a liquid junction member having N discrete nanochannels, each nanochannel having a diameter D and a length L;

a reference electrolyte solution passing through the member, and having a viscosity η;

wherein the member and the electrolyte are configured such that $\frac{D^2 \Delta P}{32 \eta L}$ is greater than about 0.1 centimeter per second, wherein ΔP is the difference between the pressure of the electrolyte as it enters the member and the pressure of the electrolyte as it exits the member.

17. A combination electrode comprising the flowing junction reference electrode of Claim 16 and a sensing electrode.

18. The combination electrode of Claim 17, wherein the sensing electrode is selected from the group consisting of pH electrodes, other ion-selective electrodes, and redox electrodes.

19. A flowing junction reference electrode comprising:

a reference electrolyte solution flowing through a liquid junction member and into a sample solution at a linear flow rate, wherein:

the electrolyte solution has a viscosity η and a pressure P_E;

the sample solution has a pressure P_S such that P_E and P_S defining a pressure differential ΔP;

the member is situated between the electrolyte solution and the sample solution;

the member has N discrete nanochannels, each nanochannel having a diameter D and a length L; and

wherein ΔP, D, η, and L are selected such that the linear flow rate of the electrolyte solution through the nanochannels and into the sample solution is greater than about 0.1 centimeter per second.

20. The electrode of Claim 19, wherein N is greater than approximately 10 and less than approximately 100,000.

21. The electrode of Claim 19, wherein N is greater than approximately 10 and less than approximately 10,000.

22. The electrode of Claim 19, wherein N is greater than approximately 10 and less than approximately 1,000.

23. The electrode of Claim 19, wherein N is greater than approximately 10 and less than approximately 800.

24. The electrode of Claim 19, wherein N is greater than approximately 10 and less than approximately 400.

25. The electrode of Claim 19, wherein N is greater than approximately 10 and less than approximately 200.

26. The electrode of Claim 19, wherein N is greater than approximately 10 and less than approximately 100.

27. The electrode of Claim 19, wherein N is greater than approximately 100 and less than approximately 10,000.

28. The electrode of Claim 20, wherein D is greater than approximately 1 nanometer and less than approximately 900 nanometers.

29. The electrode of Claim 20, wherein D is greater than approximately 10 nanometers and less than approximately 500 nanometers.

30. The electrode of Claim 20, wherein D is greater than approximately 40 nanometers and less than approximately 250 nanometers.

31. The electrode of Claim 20, wherein L is greater than approximately 500 micrometers.

32. The electrode of Claim 20, wherein L is greater than approximately 0.5 micrometer and less than approximately 300 micrometers.

33. The electrode of Claim 20, wherein L is greater than approximately 6 micrometers and less than approximately 200 micrometers.

34. A flowing junction reference electrode comprising:

a liquid junction member situated between a pressurized reference electrolyte solution and a sample solution, the junction member having N discrete nanochannels, each nanochannel having a diameter approximately D;

wherein N and D are such that (i) the pressurized reference electrolyte solution flows through the nanochannels and into the sample solution at a linear velocity v greater than about 0.1 centimeter per second, and (ii) a volumetric flow q from the electrolyte solution into the sample solution is less than about 60 micro-liter per hour.

35. The reference electrode of Claim 34, wherein q is less than approximately 10 microliters per hour.

36. The reference electrode of Claim 34, wherein q is less than approximately 1 microliters per hour.

37. The reference electrode of Claim 34, wherein v is greater than approximately 0.4 centimeter per second.

38. The reference electrode of Claim 34, wherein v is greater than approximately 4.0 centimeters per second.

39. The reference electrode of Claim 34, wherein v is greater than approximately 11.0 centimeters per second.